Tanta university
Faculty of engineering
Computer and automatic control department

Data structures and Algorithms course
Second year students
Sheet 3, Date : 24/10/2011

Sheet 3: Basic sorting algorithms

1. Write a C# console program that creates an array of 10 numbers all are of type double. The program then fills the array with random double numbers each of them is a positive double that is less than 100. Then it prints the array to the screen, sorts the array in descending order using Bubble sort algorithm and reprints the sorted array to the screen. It is preferable to do array printing and sorting using dedicated function or methods.

2. Change the program in problem 1 to count the number of array element visits done and the number of data interchanges (swap) occur during the sorting. The program should also print these two counts after finishing doing its work.

3. Using the program you created in problem 2, runs the program on the array sizes given in the table below and mark the corresponding data then draw a graph the represent the results. Regarding your graph give some statements about the followings:
   - How does the visits count change with the number of elements in the array?
   - How does the data-interchanges count change with the number of elements in the array?
   - How are these two counts related to the execution time of the bubble sort?

   Hint: you can disable printing to make result marking easier.

Array size	Visits count	Data interchanges count
10		
100		
1000		
10000		
20000		

4. Write a C# console program that creates an array of 10 numbers all are of type double. The program then fills the array with random double numbers each of them is a positive double that is less than 100. Then it prints the array to the screen, sorts the array in descending order using Selection sort algorithm and reprints the sorted array to the screen. It is preferable to do array printing and sorting using dedicated function or methods.

5. Change the program in problem 4 to count the number of array element visits done and the number of data interchanges (swap) occur during the sorting. The program should also print these two counts after finishing doing its work.

6. Using the program you created in problem 4, runs the program on the array sizes given in the table below and mark the corresponding data then draw a graph the represent the results. Regarding your graph give some statements about the followings:

- How does the visits count change with the number of elements in the array?
- How does the data-interchanges count change with the number of elements in the array?
- How are these two counts related to the execution time of the bubble sort?

Hint: you can disable printing to make result marking easier.

Array size	Visits count	Data interchanges count
10		
100		
1000		
10000		
20000		

7. Write a C# console program that creates an array of 10 numbers all are of type double. The program then fills the array with random double numbers each of them is a positive double that is less than 100. Then it prints the array to the screen, sorts the array in descending order using Insertion sort algorithm and reprints the sorted array to the screen. It is preferable to do array printing and sorting using dedicated function or methods.

8. Change the program in problem 7 to count the number of array element visits done and the number of data Dragging occur during the sorting. The program should also print these two counts after finishing doing its work.

9. Using the program you created in problem 4, runs the program on the array sizes given in the table below and mark the corresponding data then draw a graph the represent the results. Regarding your graph give some statements about the followings:
   - How does the visits count change with the number of elements in the array?
   - How does the data-interchanges count change with the number of elements in the array?
   - How are these two counts related to the execution time of the bubble sort?

   Hint: you can disable printing to make result marking easier.

Array size	Visits count	Data dragging count
10		
100		
1000		
10000		
20000		

10. Consider problem 1 and modify the bubble sorting algorithm so that it stops working if a pass is done without any swapping.

11. Consider problem 4 and modify the selection sort algorithm so that swapping only occurs when necessary.